

# Why do trees grow there?

## Summary

Students will learn, through inquiry and experimentation, why certain plants grow in specific locations in the mountains. In a field trip to a low elevation canyon, students will measure several abiotic and biotic factors on north and south-facing slopes to help understand why there is different vegetation. By examining physical and biological factors in a landscape and later examining the data, students will understand some of the major factors that determine where vegetation grows in mountain ecosystems. This lesson requires two 45 minute class period, a half-day field trip.

## Time Frame

2 class periods of 45 minutes each

## Group Size

Small Groups

## Life Skills

Thinking & Reasoning, Communication

## Materials

A location for a field trip: The field trip site needs to be a low to mid-elevation canyon where there are north and south-facing slopes with very different vegetation. Neffs Canyon of Mill Creek Canyon in Salt Lake Valley works is a good example of a field trip site. The following list of materials are what is needed for one group. You need to have this entire list of materials replicated for every group.

soil temperature probe

soil moisture probe

soil nutrient test kit

50m measuring tape

meter stick

inclinometer

tree identification guide (book or constructed by teacher)

GPS, or altimeter

clipboard

data sheets

## Background for Teachers

The type of vegetation that grows in a specific location is dependent on both biotic (biological) and abiotic (physical) factors. At low elevations (5-7,000 feet) in Utah, the type of vegetation that grows is very much dependent on abiotic factors and local geography that influences abiotic factors (elevation, slope angle, aspect). Along the Wasatch Front, there are many east-west running canyons that have north and south-facing slopes separated by a creek or river. At 5-7,000 feet vegetation on south-facing slopes is typically dominated by scrub oak, juniper or grasses. Vegetation on north-facing slopes is dominated by conifer and deciduous trees including white fir, Douglas fir, aspen, maple and scrub oak. These vegetation types exist mainly due to differences in the amount of available water on each slope. While north- an south-facing slopes receive the same amount of precipitation, there is less water available for plants on south-facing slopes. South-facing slopes receive much more solar radiation than north-facing slopes. High radiation on south-facing slopes leads to high soil

temperatures, greater evaporation of water from soils and lower soil moisture. Trees need much more water than shrubs and will not grow on low elevation south-facing slopes due to a lack of water. It is the amount of available water that primarily determines what vegetation grows where on lower slopes of the Wasatch Mountains.

### Student Prior Knowledge

Students will need to understand the concept of direct and indirect light and how slope angle and orientation to a light source determine the amount of radiation received by a given area. This concept is a direct tie in with topics related to seasons. Students will need to understand differences in vegetation type and tree type. The main vegetation types are grasses, shrubs and trees. Students should also be able to identify deciduous and coniferous trees. It is not necessary for students to identify tree species, but this is an opportunity for extension of the lesson if desired. Students also should know how to use the scientific equipment before heading to the field site. To add an element of inquiry to the lesson, the teacher should not tell students the main factors that determine what vegetation grows where, it is the goal of the lesson for students to understand for themselves that abiotic factors affect the type of vegetation.

### Intended Learning Outcomes

#### 1. Use Science Process and Thinking Skills

- a. Observe objects, events and patterns and record both qualitative and quantitative information.
- d. Select and use appropriate technological instruments to collect and analyze data.

#### 3. Demonstrate Understanding of Science Concepts, Principles and Systems

- a. Know and explain science information specified for the subject being studied.

### Instructional Procedures

Please see the attached document entitled "Ecosystem\_trip"

This is also a handout that should be given to students.

### Strategies for Diverse Learners

Students will be working in small groups. In each small group, there are many different tasks for collecting and analyzing data. It is the intention of this lesson that students will have the opportunity to work on several different aspects of scientific research.

### Extensions

There are several possible extensions for this lesson. One, student can learn to identify the major tree and plant species on the field trip site. Two, students can create a dichotomous key of the dominant plant species at the field trip site. Three, most potential field trip sites should have a creek in the riparian zone of the canyon. Students can be asked questions about water quality and measure aspects of water quality.

### Assessment Plan

Students will be assessed by either writing a lab report and/or giving a short presentation on the research or an aspect of the research.

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